

History and Development of the JANET Network

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Joint Network Team 1979 ->1994

- ◆ Created March 1979 - 6 staff
- ◆ followed report from Computer Board and Science Research Council
- ◆ Based at Rutherford Laboratory
- ◆ Large variety of networks
- ◆ different technologies
- ◆ different control and management

The X.25 Network

- ◆ X.25 was a CCITT standard
- ◆ in use for UK higher education
- ◆ adopted by the Post Office for a public data network - PSS - Packet Switching Service
- ◆ Upper Layer Protocols - diverse
- ◆ JNT - Coloured Books based on earlier work by the DTI and Post Office
- ◆ YBTS - Yellow Book Transport Protocol provides unification over varying technologies

The Protocols

- ◆ The coloured Book Protocols made mandatory in all Computer Board funded procurements
- ◆ The H.E. community become early large scale users of PSS
- ◆ September 1980 - JNT propose the UK H.E. build its own network using X.25
- ◆ Legal ?

JANET is born in April 1984

- ◆ Her parents are the SERC/NERC wide area networks
- ◆ Based on X.25
- ◆ Link speeds at 9.6kbit/sec
- ◆ served about 50 sites
- ◆ upgrade mid 80s to 64kbit/sec + 2Mbit/sec trunk
- ◆ early 1990s goes to 2Mbit/sec links
- ◆ Highest performance X.25 network in the world

Community Expands

- ◆ Late 1980s Funding arrives to support Polytechnics and Colleges
- ◆ research and HE outside universities join
- ◆ sites number 200 +
- ◆ Network Executive added to JNT - two groups now total about 12 staff
- ◆ Local Area Networks appeared in early 1980s
- ◆ X.25 or Cambridge Ring ?

UK versus the Globe....

- ◆ Orange Book for transport over Cambridge Ring - reduces to equivalent to X.25 !!
- ◆ Orange Book lead to ISO 8802-7
- ◆ The world adopts Ethernet
- ◆ We develop "Pink Book" to make Ethernet start to look like X.25 again...
- ◆ JNT PAD (Packet Assembler Disassembler) [which allowed “terminals” to connect to X25 and/or Ethernet networks]

The LAN deployments

- ◆ start to deploy Ethernet at 10 Mbit/sec
- ◆ early 1990s some FDDI at 100 Mbit/sec
- ◆ 1994 ATM LAN programme
- ◆ Coloured Books key Transition to ISO protocols planned
- ◆ White Book produced
- ◆ X.500 directory services
- ◆ X.400 email services

But the World uses TCP/IP

- ◆ Aberystwyth Computer Science had used TCP/IP since early 80s
- ◆ Pilot JANET IP service (JIPS) introduced in early 1991
- ◆ IP and X.25 share the bandwidth. IP carried over X.25 tunnels
- ◆ 1987 64Kbit/sec link JANET <-> NFSNET
- ◆ 1994 2Mbit/sec Atlantic link

JANET goes SUPER

- ◆ 1989 JNT propose SuperJANET
- ◆ BT get 18 Million pound contract in November 1992
- ◆ 34 Mbit/sec SMDS network
- ◆ 34 Mbit/sec ATM network
- ◆ upgrades planned to 155 Mbit/sec
- ◆ JNT staff reach 22
- ◆ SuperJANET outstrips Al Gore's vision

JNT is dead, Long Live UKERNA

- ◆ JNT Association formed in December 1993
- ◆ From April 1994 - takes over JANET
- ◆ Trades as UKERNA - United Kingdom Education and Research Network Association
- ◆ funded by JISC of HEFCE, HEFCW, SHEFC and DENI

SuperJANET II

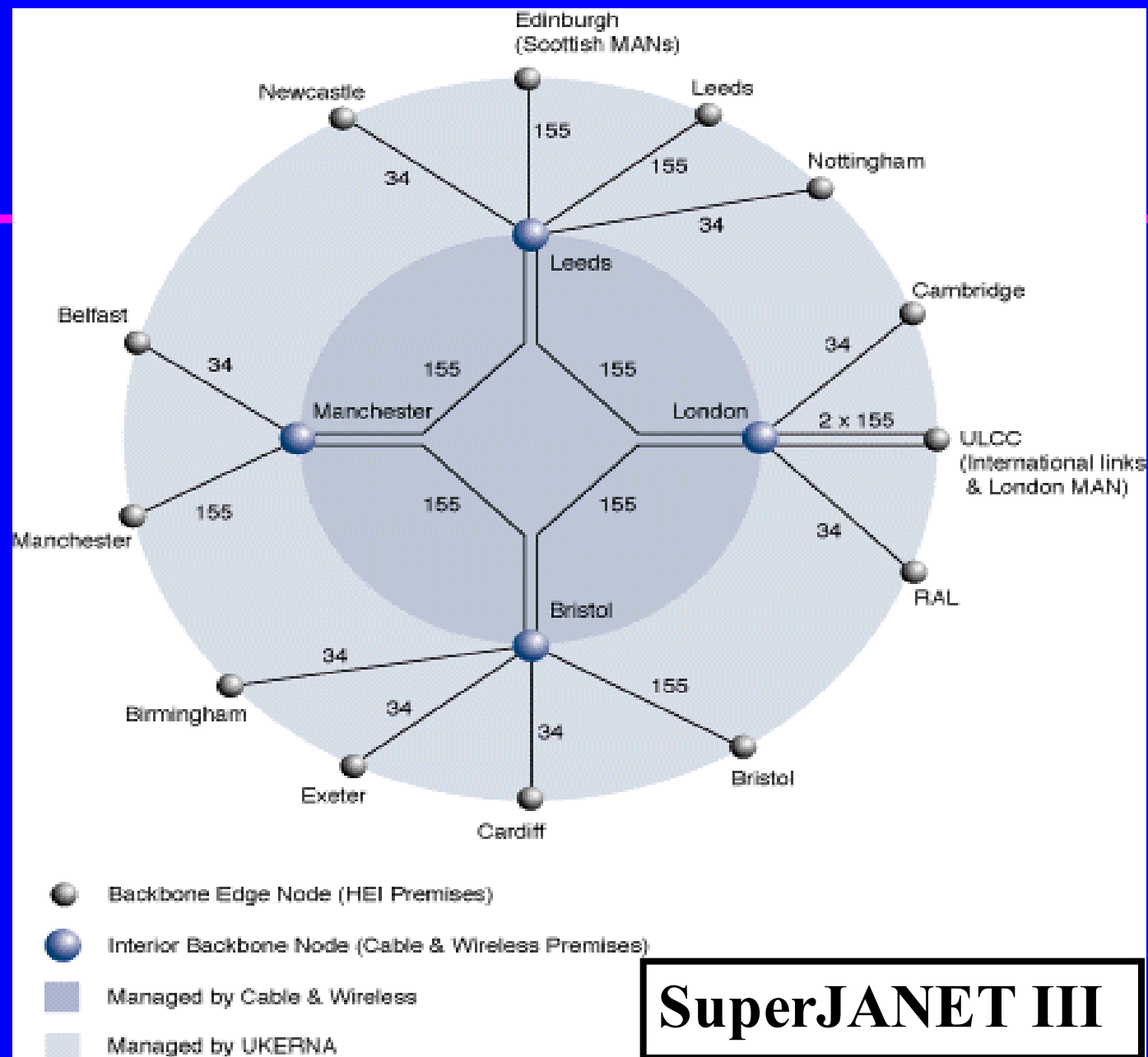
- ◆ Metropolitan Area Network procurements (MANs) - e.g. South Wales MAN
- ◆ new SJ links to 27 institutions, either SMDS (4Mbit/sec) or leased lines at * Mbit/sec
- ◆ Aberystwyth gets 8Mbit/sec - Cardiff
- ◆ Other MANs, Edinburgh, Glasgow, Fife&Tayside, Aberdeen
- ◆ Other high speed links

SuperJANET III planned for Spring 1998

- ◆ Cable and Wireless win contract
- ◆ four core sites - Leeds, Manchester, Bristol and London linked by a ring of 155Mbit/sec links (Interior Backbone Nodes)
- ◆ 13 Backbone Edge Nodes established at Cardiff, Exeter, Birmingham, Manchester, Belfast, Newcastle, Edinburgh, Leeds, Nottingham, Cambridge, ULCC, RAL and Bristol

SJ III

- ◆ BENs linked to IBNs via C&W
155Mbit/sec and 34Mbit/sec ATM links
- ◆ Some sites link to BENs directly, others use
BTs SMDS network
- ◆ SJ III goes on-line on schedule !



International Connectivity

- ◆ Grows over the years
- ◆ June 1997 - 45 Mbit/sec - TeleGlobe
- ◆ 28th May 1998 2*45 Mbit/sec
- ◆ Europe - 34 Mbit/sec
- ◆ Other UK ISPs 100 Mbit/sec
- ◆ Charges announced for TransAtlantic Link

TransAtlantic Charges

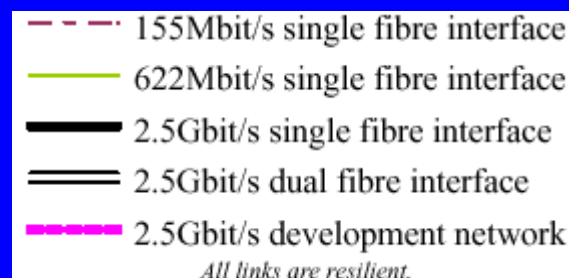
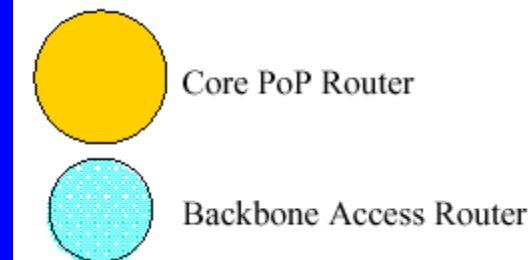
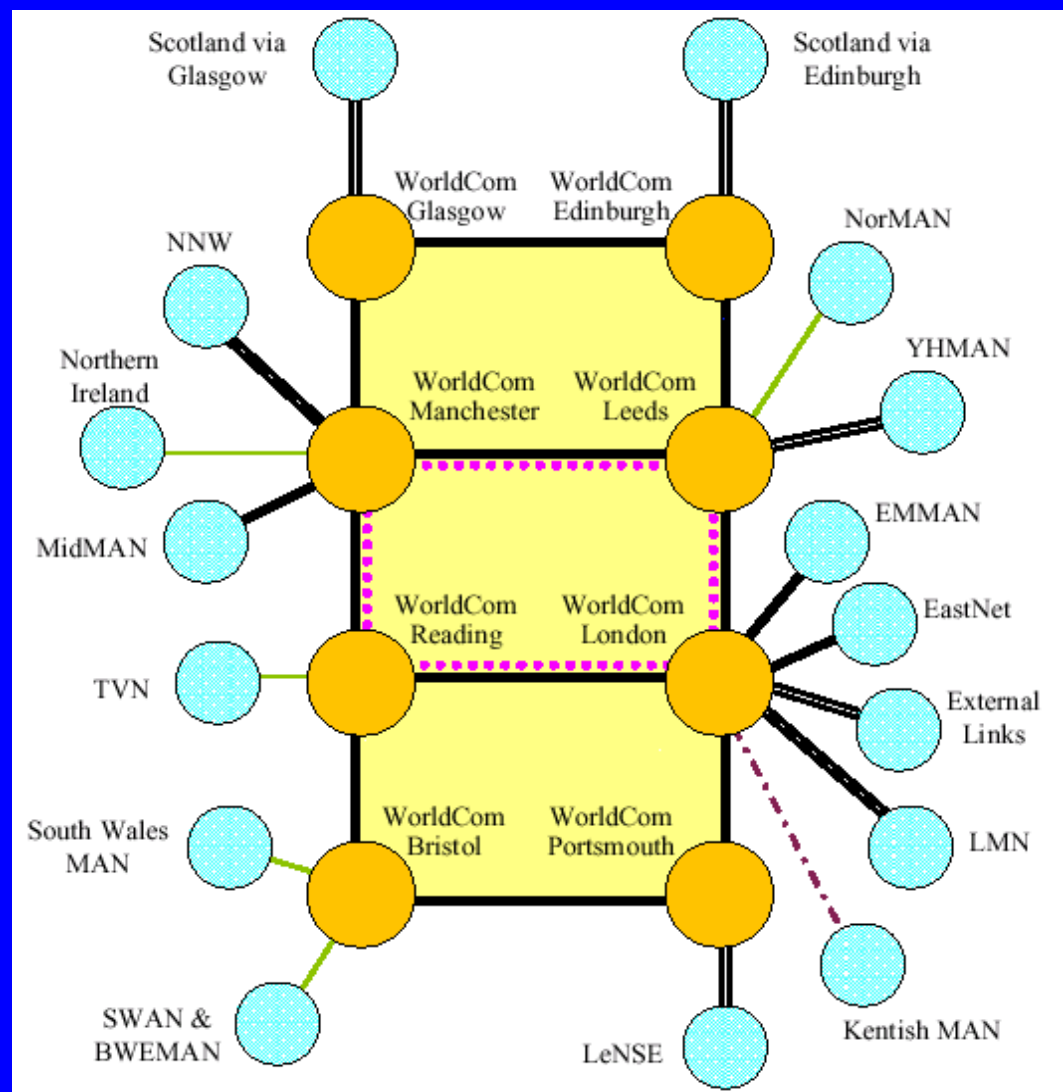
- ◆ All traffic into JANET is charged
- ◆ 2p / Mbyte inc. VAT
- ◆ 01:00 -> 06:00 free
- ◆ First invoices November 1998 - to cover August -> October 1998
- ◆ Traffic Itemisation services
- ◆ Transatlantic statistics
- ◆ Charges at Aberystwyth ??

SuperJANET4 - the vision

- ◆ **Forces for change:** extending access; regionalisation; harnessing new technology; broadening the user base and applications base
- ◆ Gigabit capacity with growth built in
- ◆ Linking all H.E. MANs
- ◆ WorldCom provides transmission, UKERNA provides IP overlay
- ◆ Initial SDH 2.5 Gbit/sec, later DWDM 20Gbit/sec

SuperJANET4 - topology

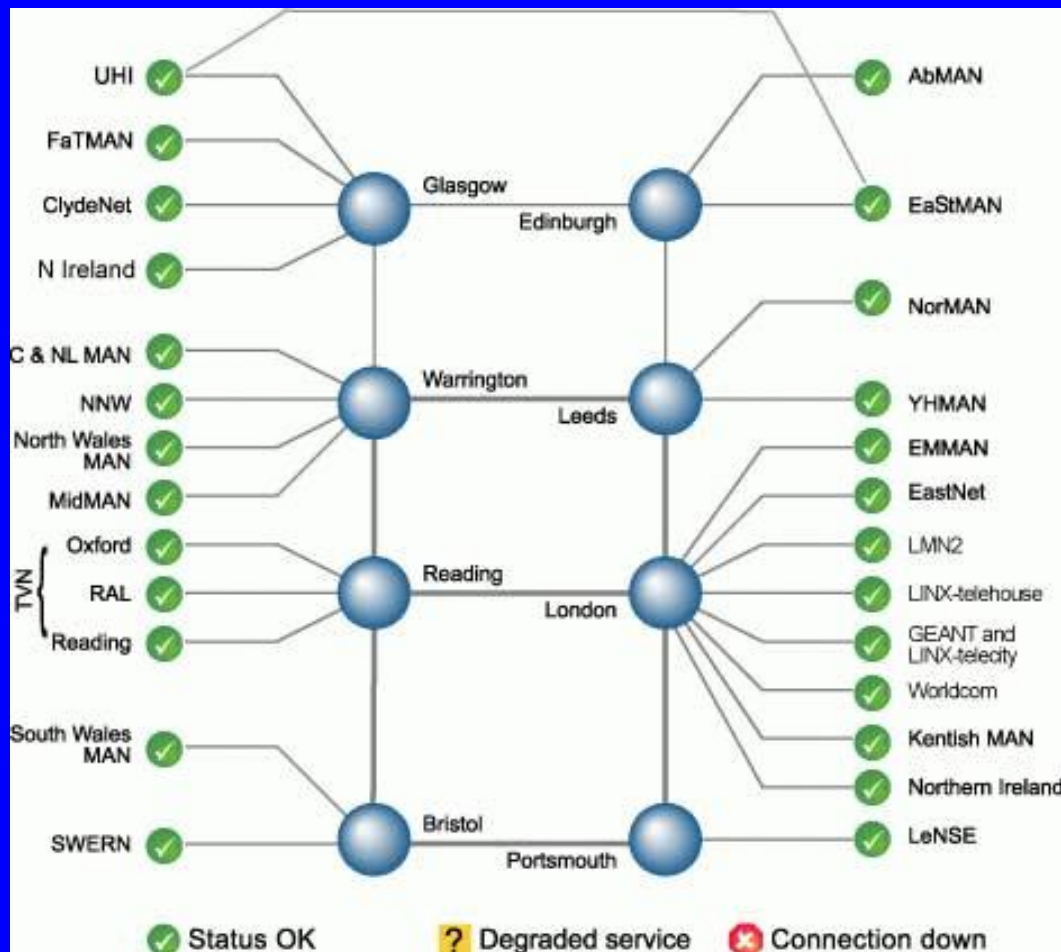
◆ March 2001



SuperJANET4 - rollout

- ◆ Circuits installed 31st Oct - 18th Dec, 2000
- ◆ Core routers delivered 15th Nov - 28th Nov
- ◆ MAN routers 27th Nov - 19th Dec, 2000
- ◆ SJ4 transition 5th Dec - 20th Mar, 2001
- ◆ SJIII ends 31st Mar, 2001
- ◆ (plan was) Core to 10 Gbit/sec during 2001
- ◆ (plan was) Core to 20 Gbit/sec during 2002
- ◆ JANET Core actually to 10Gbit/sec during 2002

Netsight – monitoring SJ4

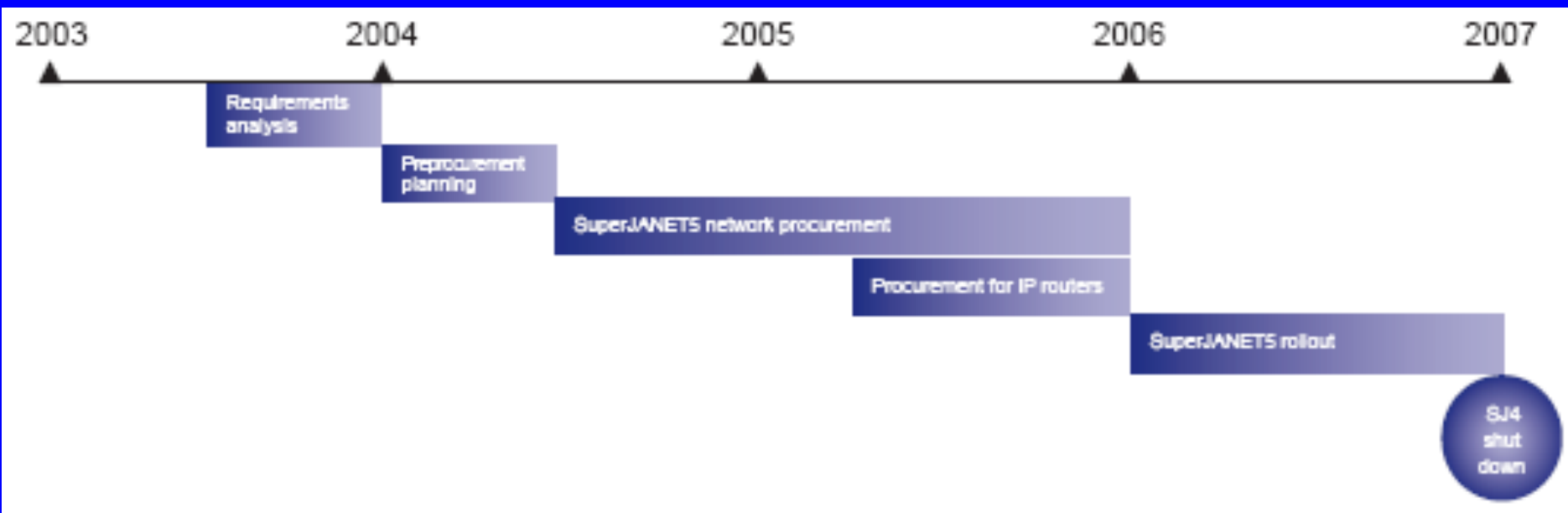


cardiff.netsight.ja.net (not logged in)

Thursday 29 April 2010 @ 10:37

[PSBA] Aberystwyth University	up	Up since Mon Mar 29 20:04:00 2010
[PSBA] Bangor University	up	Up since Tue Apr 20 20:24:00 2010
[PSBA] Barry College	up	Up since Mon Mar 29 15:43:00 2010
[PSBA] Barry College, Cardiff Construction Training Centre (*)	up	Up since Mon Nov 9 00:05:00 2009
[PSBA] Bridgend College (*)	up	Up since Thu Nov 12 00:50:00 2009
[PSBA] British Geological Survey, Caerdydd	up	Up since Wed Jan 27 13:29:00 2010
[PSBA] Cardiff University	up	Up since Sat Dec 12 08:32:00 2009

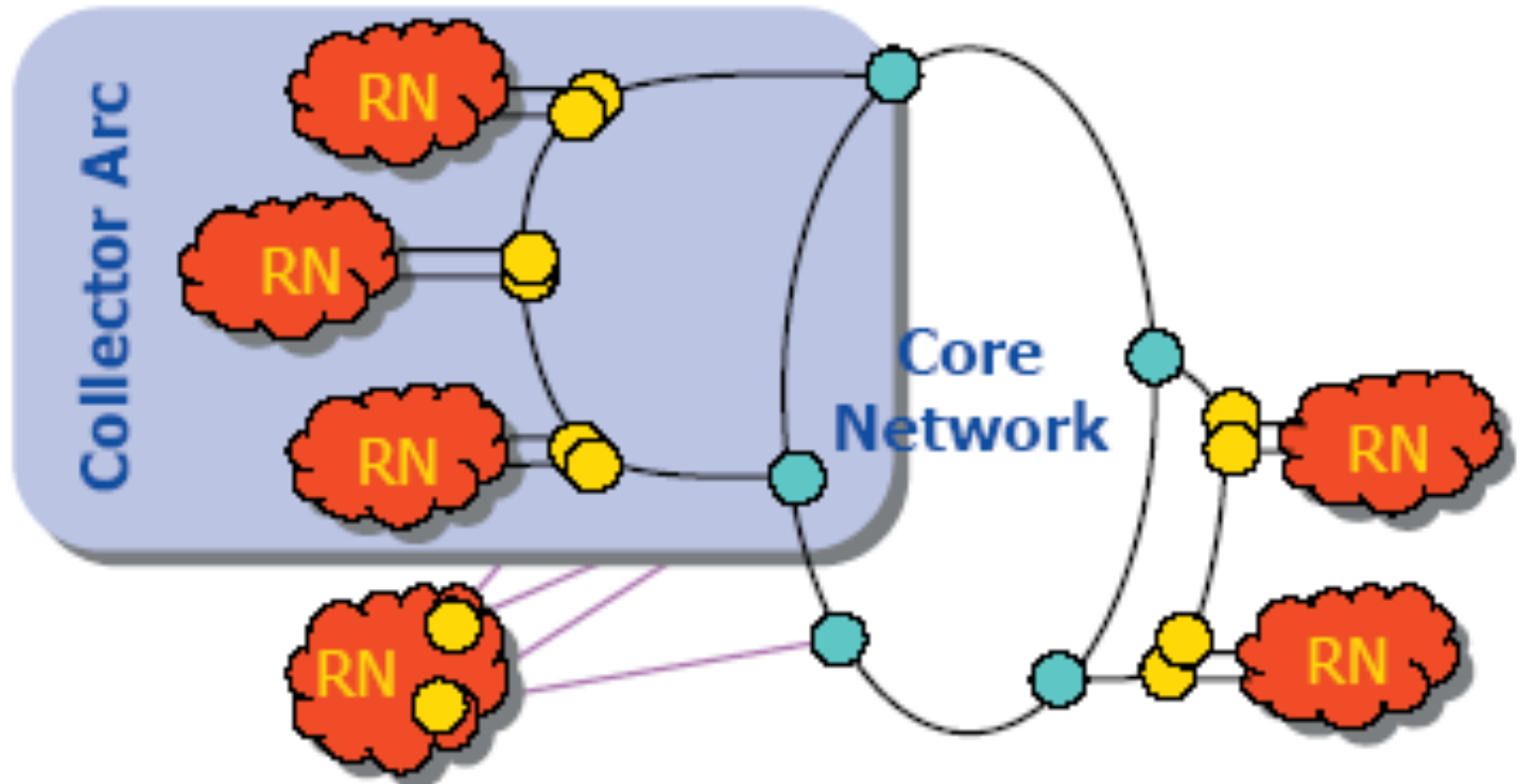
SJ5 Planning and Timescale



SuperJANET5 key design criteria

<i>Requirement</i>	<i>Design Criteria</i>
Reliability	Minimise single points of failure. Reduce components and complexity.
Scalability	UKERNA controls costs of adding large amounts of bandwidth when needed.
Separability	Configure parallel purpose-built networks via control at the transmission-level.
Flexibility	UKERNA has the ability to change configuration of the network quickly when needed.
Visibility	Controlled access to network monitoring and measurement information by end-users.

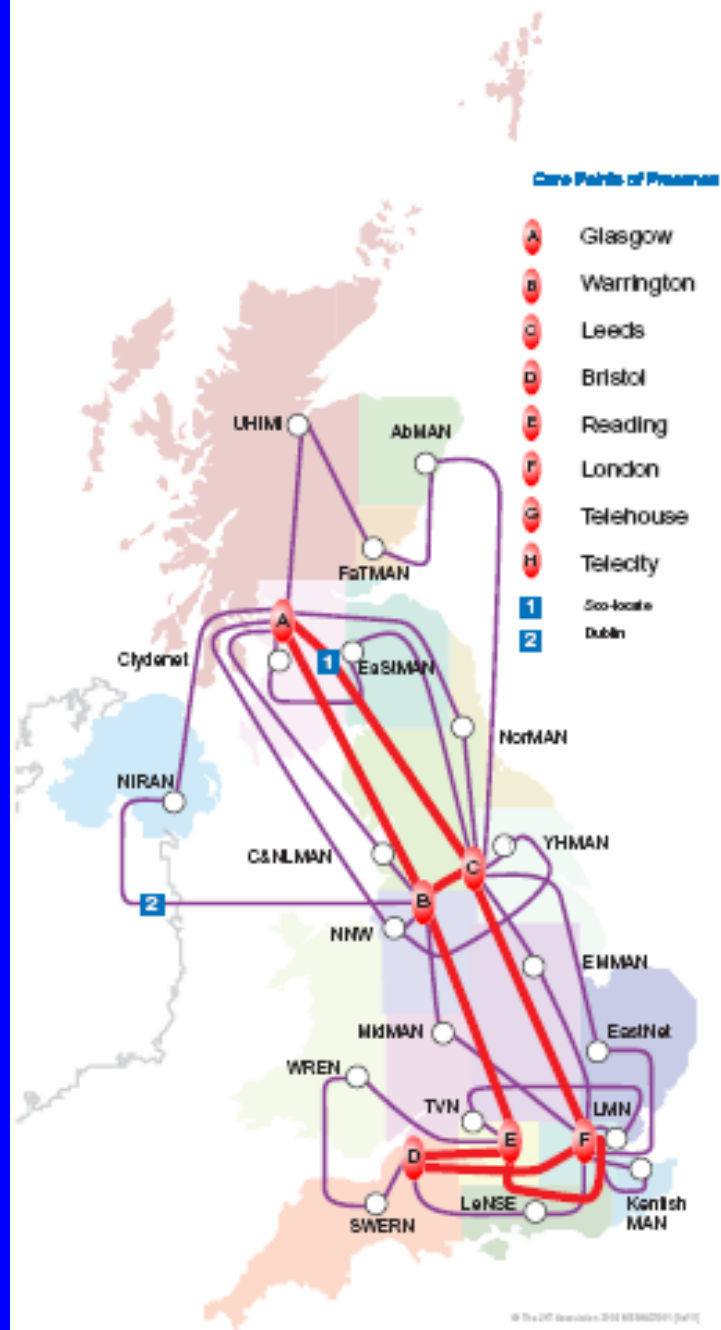
SJ5 Transmission Architecture



SJ5 Suppliers

- ◆ Lucent Technologies supplied Juniper T640 carrier grade IP routers
- ◆ Verizon Business (previously known as MCI) supplied the fibre network

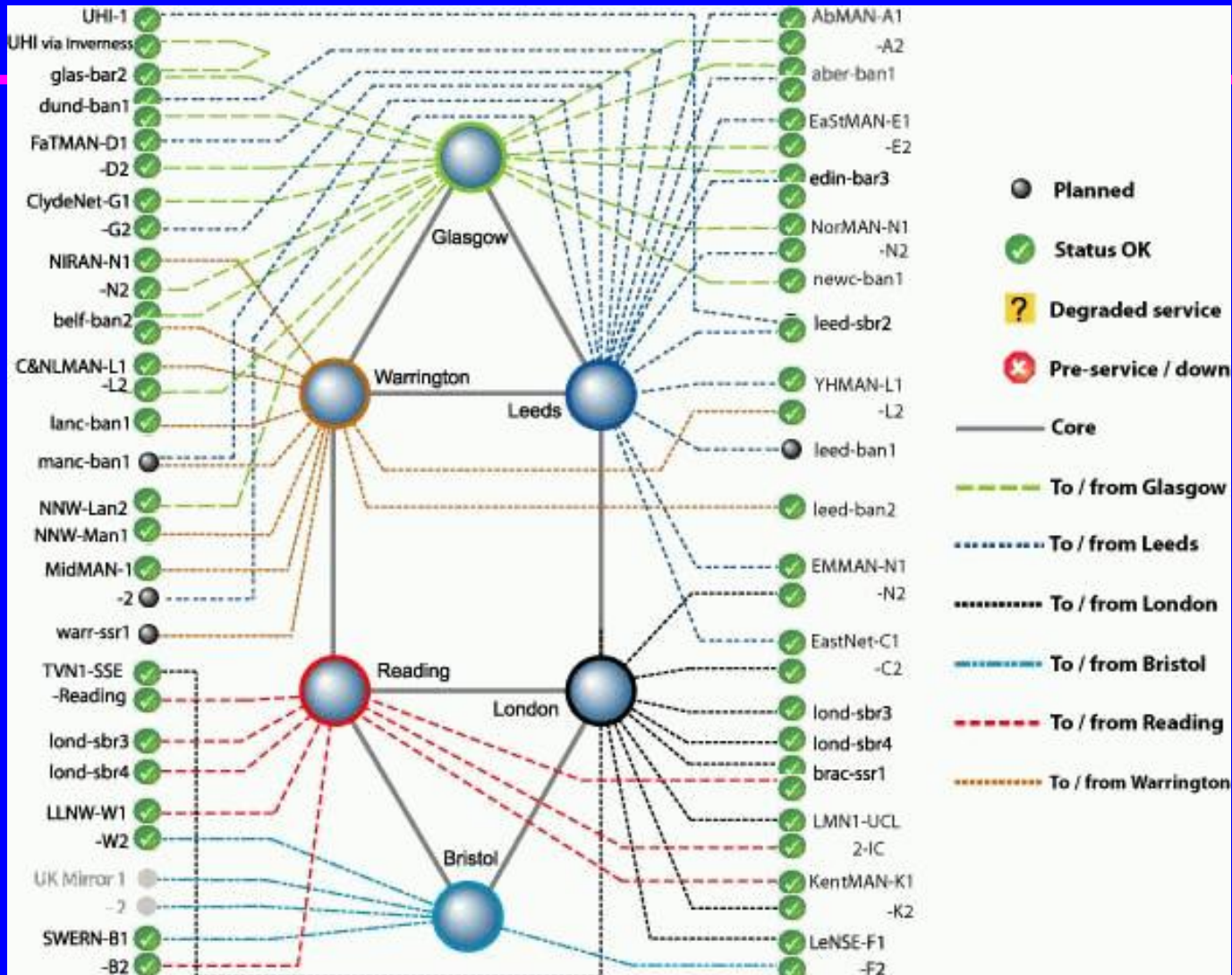
Topology of SuperJANET5



State of SJ5 in April 2008

- ◆ All the core was complete and in use
- ◆ All regional networks were connected to SJ5
- ◆ All Backbone Access Nodes were complete
- ◆ Also, some 40 Gbit/sec links were in use

New Netsight – from Summer 2008



April 2009 April 2013

- ◆ 25th Anniversary of JANET's creation (2009)
- ◆ Core links to 100 GBit/sec in 2010/11
- ◆ Major Projects – April 2013
 - Moonshot – managing user identities
 - Janet6 – next generation of JANET
 - 4G - The Janet 4G project has been launched to explore the potential use of 4G technology across Janet mobile services.
- ◆ Collaborative Projects – April 2013
 - eduroam Public Transport - The Public transport trial was set up to record how people would make use of an eduroam service on public transport routes.
 - Arts and Humanities - Showing how your arts and humanities groups (eg. orchestras and university faculties) can use Janet to stream demonstrations, masterclasses and simultaneous collaborations.

Netsight Welsh Network 14 April 2016

Home

Traffic Lights

Network Maps

Quick Status

Home

Wales Monitored Status

Home

Wales Monitored Status

Wales Public

60 up

0 down

0 degraded

Wales Public

Public measurements are visible to all users of Netsight, and correspond to the counts shown on the lights on the home page status summary.

Measurement	Status	Last Change	Previous Change	Measured At
JANET(UK)/Regional Delivery Areas/Wales				
Aberystwyth University LLandinam Building	Up	Up since 05/04/2016 07:50 BST	Degraded from 05/04/2016 07:49 BST	
Aberystwyth Visualisation Centre	Up	Up since 05/04/2016 07:50 BST	Degraded from 05/04/2016 07:48 BST	
Bangor University	Up	Up since 05/04/2016 07:51 BST	Down from 05/04/2016 07:49 BST	
Barry College, Colcot Road	Up	Up since 08/04/2016 10:43 BST	Degraded from 08/04/2016 10:42 BST	
Bridgend College, Weston	Up	Up since 11/03/2016 12:26 GMT	Down from 11/03/2016 12:24 GMT	
Cardiff and Vale College, Canal Parade	Up	Up since 11/03/2016 12:25 GMT	Degraded from 11/03/2016 12:24 GMT	
Cardiff Metropolitan Halls of Residence	Up	Up since 11/03/2016 12:25 GMT	Degraded from 11/03/2016 12:24 GMT	
Cardiff Metropolitan University	Up	Up since 05/04/2016 08:06 BST	Degraded from 05/04/2016 08:05 BST	
Cardiff University Newport Road	Up	Up since 28/12/2015 07:01 GMT	Down from 28/12/2015 06:55 GMT	
Cardiff University, Cathays Campus	Up	Up since 11/03/2016 12:25 GMT	Degraded from 11/03/2016 12:24 GMT	
Coleg Cambria, Deeside	Up	Up since 11/03/2016 12:26 GMT	Degraded from 11/03/2016 12:25 GMT	
Coleg Cambria, Llysfasi	Up	Up since 13/04/2016 14:35 BST	Degraded from 13/04/2016 14:34 BST	
Coleg Cambria, Northop	Up	Up since 13/04/2016 10:02 BST	Degraded from 13/04/2016 10:01 BST	

Janet6 - Business Case

So, why are we updating the Janet network infrastructure?

SuperJanet5 has served our customers well. However, in the seven years since we launched SuperJanet5, there have been significant technological developments of which we need to take advantage, and also a shift in how the network is being used.

Research and education have taken huge leaps forwards over this time. We want to make sure that the network infrastructure will continue to help the sector to respond to policy changes, drive the UK economy forwards and meet the needs of our users. With the huge growth in research data, remote working and the increase in technology for teaching and learning, we need to ensure that Janet, as the underpinning infrastructure, can support all of these activities.

Learning lessons from how we built and managed SuperJanet5, we need to ensure that the network infrastructure provides all of our customers with the best value. This means that we need to ensure the network has the capacity, resilience and flexibility for research and education, across the UK, for the next 5 to 10 years.

<https://www.ja.net/products-services/janet-futures/janet6/business-case>

Janet6 - Positive Impact

The positive impact to Janet customers

Functionality: we're incorporating functionality into the network architecture, which will enable you to address the political and financial challenges of the future, and plan your business strategies accordingly.

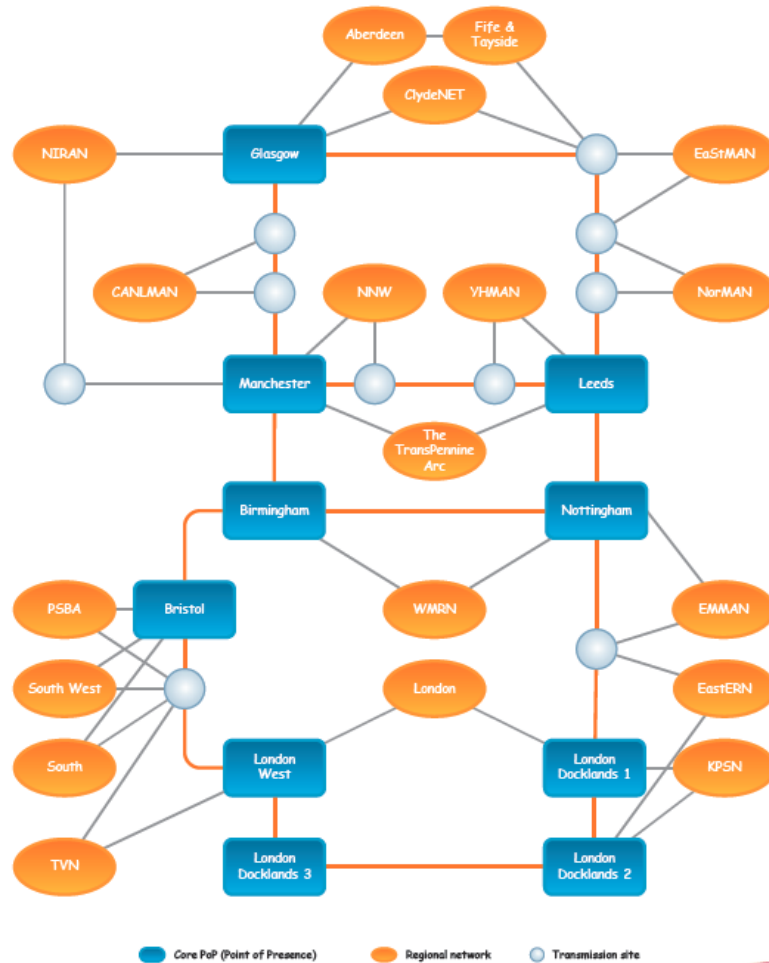
So, if you are considering outsourcing your data provision, using cloud technologies to reduce financial and environmental costs, Janet6 will enable you to do this.

Capacity: As bandwidth demands have doubled every 18 months, network capacity over SuperJanet5 has grown to meet these demands. You told us that this amount is expected to increase in the short, medium and long term, as you move towards cloud services & outsourcing and as research projects continue to produce increasing amounts of data. Janet6 is being built with increased capacity, and designed so that any additional capacity requirements needed over time, can be provided more easily and with much more controlled costs.

Reliability: SuperJanet5 network was built with a flexible and scaleable architecture to meet your on-going needs. Over the past seven years, the network has evolved to ensure busy parts of the network are adequately provisioned and additional resilience provided across the backbone. This means that you can always rely on the network being available and fully operational, as and when you need it.

With the increased reliance that our users have on data and electronic communication, and the increasing presence of security threats, it is important that Janet6 continues to provide even greater reliability for all of our users. It is an integral part of Janet6's development and essential to its evolution.

<https://www.ja.net/products-services/janet-futures/janet6/positive-impact>



Some up-to-date (Spring 2016) JANET References.

<http://www.slideshare.net/JISC/jisc-update-network-operations-workshop44>

<http://www.slideshare.net/JISC/jisc-update-janet6-upgrade-workshop44>